United States
Department of
Agriculture

Forest Service

Pacific Northwest
Research Station

Research Paper
PNW-RP-411
April 1989

Alaska Midgrade Logs: Supply and Offshore Demand

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Abstract

Flora, Donald F.; McGinnis, Wendy J. 1989. Alaska midgrade logs: supply and offshore demand. Res. Pap. PNW-RP-411. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 13 p.

The outlook for shipments and prices of export logs from Alaska differs significantly by grade (quality class). For the majority lying in the middle of the value range, the trend of prices is projected to increase $200 per thousand board feet, or about 55 percent, by 2000. Shipments are expected to rise about 30 percent by 1995 and then subside about 10 percent. These conclusions are based on a country-by-country assessment of consuming and competing supply regions around the Pacific Rim, and assume currency exchange rates remain at 1987 levels and no inflation occurs.

Keywords: Markets (external), supply/demand (forest products), trade (Pacific Rim), log exports (Alaska), Alaska timber trade.

Summary

"Performance-grade" logs are defined, in this and companion analyses, as softwood logs that compete with the export equivalent of Pacific Northwest No. 2 saw logs. Among the criteria for performance-grade logs are scaling diameters larger than 12 inches, negligible defects, small knots, and low taper. Some 80 percent of the export logs from Alaska fall in this grade. (Most of the rest are Selects, which are higher in value.)

Alaska exports about 7 percent of the volume of performance grades consumed by Japan and China (Korea participates negligibly in this grade group). In 1987, the reference year chosen because it was at neither the top nor the bottom of the current business cycle, the average dockside U.S. price of these logs ranged from $330 to $360 per thousand board feet (MBF).

Without inflation, at 1987 currency exchange rates, and with moderate economic growth in Pacific Rim customer and competitor countries, performance-grade prices are projected to rise about 3 percent per year through the rest of this century, or $160 per MBF by 1995 and another $40 by 2000. Intersections of supply and demand curves in the accompanying figures show the volumes and prices experienced in the reference year and expected in the future.

Export volumes from Alaska are expected to increase about 70 million board feet per year by 1995 because of higher prices; this will be followed by a decline to a level about 40 million board feet above 1987. The higher prices will augment rising volumes in generating increased payments to Alaska log sellers.

These results contrast with those for lower, "construction-grade" logs, analyzed elsewhere. For the smaller logs, prices are expected to rise about 1 percent per year. For both grade groups, the projected upward price trends may be obscured by cyclic economic swings.

Introduction

We report here estimates for 1995 and 2000 of Alaska exports and prices of "performance-grade" (midrange quality) softwood logs. The projections reflect basic market trends; they do not represent an effort to forecast cyclic movements.

In 1986, Flora and Vlosky reported on the Pacific Rim market outlook for "construction-grade" softwood logs. The intent was to assay prospects for Alaska timber that has been economically unattractive to harvest but which, if placed in the export trade, would compete with coast-grade No. 3 saw logs from the Pacific Northwest and with comparable timber elsewhere. Supply and demand functions were developed for each Pacific Rim country exporting or importing logs at the low end of the value spectrum. Such logs include radiata pine (*Pinus radiata*), Soviet larch (*Larix* spp.), a fraction of other Soviet species, and the comparable segment of export logs from Canada. Flora and Vlosky conclude that prices will rise gradually for such material through the end of this century but at a rate largely obscured by cyclic market swings.

In late 1987 and early 1988, the analysis was extended to "performance-grade" logs, which include the bulk of Alaska's export supply; these logs compete with the export equivalent of Pacific Northwest No. 2 saw logs (with scaling diameters larger than 12 inches and few defects). This category excluded "Select" grades, a market dominated by Alaska timber and representing about 20 percent of shipments from Alaska. These three grade classes—construction, performance, and selects—were defined arbitrarily to embrace in a few value strata the considerable number of quality assortments actually recognized in the trade.

Alaska competes in a vast Pacific-wide market. In the performance grades, Alaska ships about 7 percent of the volume consumed by Japan, Korea, and China. Together, their 1987 performance-grade imports corresponded to about 750 shiploads. Prices fluctuated greatly in 1987-88. A typical late-1987 price for performance-grade logs at dockside (f.a.s.) was $450 per MBF (Scribner scale).

Procedure

Analyzed individually were Alaska, Canada, the United States outside Alaska, Chile, New Zealand, and the U.S.S.R. on the supply side; and Japan, Republic of Korea, People's Republic of China (China), and the Republic of China (Taiwan) on the demand side. Supply countries were included because of their competition with Alaska in middle and lower grades.

Supply and demand equations were developed to relate each country's traded volumes to price and to domestic economic factors affecting supply or demand. In this effort, volumes were reckoned in thousands of cubic meters rather than board feet, and the prices in local currency were used. In general, the functions used data from 1963-85, the former date because U.S. log trade became significant then, the latter date because 1985 was the most recent year for which a complete basinwide data set was available. Data for later years, when they became available, were used to check the functions. A detailed discussion of the data, functions, and assumptions is in an office report available from the authors. Those matters are summarized here, and the functions are plotted by country.

Subsequent steps in the analysis paralleled those of the Flora and Vlosky construction-grade report (1986). Prices and other value information were adjusted for inflation before the equations were estimated, a step that was important not only because of high rates of inflation in certain countries but also because even small differences among countries with moderate inflation create a considerable cumulative bias over the 23-year period. Thus, benchmark prices and costs are pertinent to price levels of early to mid-1987, as are projected values.

Next, each equation was reexpressed in terms of U.S. dollars with mid-1987 exchange rates. At that time, for example, the U.S. dollar was worth about ¥138. To make prices relevant to North America dockside values, the supply and demand functions outside North America were adjusted for shipping costs. Thus, a competing supply country with a $25-shipping cost advantage over North America had its supply function repositioned to reflect the advantage.

After the national supply and demand functions were adjusted to a common market point pertinent to Alaskans, the functions were summed to create a single aggregate demand curve as seen from Alaska. This process involved summing the offshore demand functions and subtracting from them the supply functions for regions outside Alaska. Development of the individual functions is discussed below.

Results are expressed in thousands of cubic meters and dollars per cubic meter, units common outside the United States. Conversion factors to Scribner board feet depend greatly on log sizes as well as local scaling practices. For the performance grades, a conversion of 4.5 cubic meters per MBF was used. In the figures, dividing volumes by 4.5 converts million cubic meters to billion board feet and thousand cubic meters to million board feet. Multiplying by 4.5 converts prices from dollars per cubic meter to dollars per MBF.

Alaska

The supply function for Alaska was used in generating figure 1 and in making supply projections. The supply elasticity (percentage of change in volume associated with a 1-percent change in price, other things equal) for the 1987 base year was estimated at 0.46. Supply elasticities are commonly well below 1.0 for raw materials, particularly when the raw materials represent a small proportion of the market, as in Alaska.

Log supplies from Alaska have increased steadily despite declining prices. The upward trend in volume reflects the fact that most export logs are from Native corporation lands, for which ownership was not established until the 1970s. The declining prices have been attributed to the recession of the first half of this decade and to a decline in the average quality of logs sold. Gradual completion of the first cycle of harvest from Native lands is expected to steadily reduce the volume exported. Thus the supply curve for Alaska was shifted left (in fig. 1) for 1995 and 2000, with proportional shifts based on Seymour's (1988) projections.

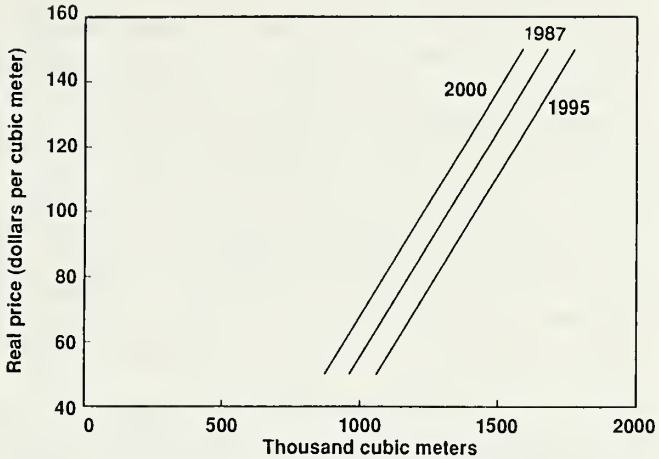

Figure 1—Export supply of midgrade softwood logs from Alaska. At any price level, the volume available for sale (at dockside) is expected to increase until 1995 and then decline.

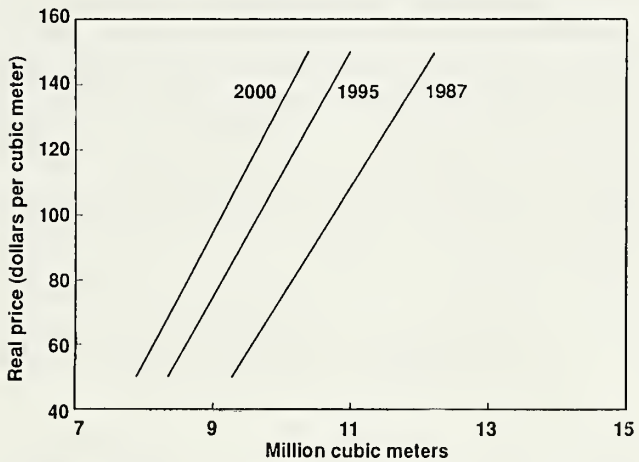

Figure 2—The export supply of midgrade softwood logs from the lower 48 States. At any price level, the dockside volume available is projected to decline through the year 2000.

The Other U.S. Pacific Coast States

The supply function for other U.S. States along the Pacific coast is plotted against prices in figure 2. As in Alaska, export shipments of performance-grade logs from these States are expected to respond to economic factors whose effects are not captured by the data for export marketing. To be specific, the proportion of performance-grade logs in the export total is expected to decline as the average age of harvested stands in western Washington and northwest Oregon continues to drop. Projections of the harvest in the Douglas-fir region have been made by Haynes and Adams (1985) for the Forest Service 1982 assessment supplement (U.S. Department of Agriculture 1982) and, more recently, for a timber analysis of the South (U.S. Department of Agriculture 1987). About a 10-percent decline is projected through the end of the 20th century.

Two approaches were used to estimate the changing character of the log supply available for export. In one, the area of stands between ages 50 and 100 being harvested, expressed as a fraction of the total area logged, was extrapolated (Washington Department of Natural Resources 1965-84). Another approach involved updating the 1975 western Washington inventory by age class and owner group (Washington Department of Natural Resources 1975). These analyses indicated that sufficient acres will be available in the over-50 age class to sustain cutting well into the 1990s. Thus, assuming that most performance-grade logs are at least 50 years old, we projected a 10-percent decline in the exports of those grades to occur by 1995, with a further 55-percent fall by 2000 for age-class reasons. These reductions were assumed at 1987 prices; they represent shifts in the supply curve. At higher prices, exports can be expected to expand beyond 1987 levels.

The slope of the supply function was taken from an equation for export supplies of performance-grade logs from the lower 48 States. At the 1987 log price, the price elasticity of this equation was 0.18.

Chile

Figure 3 illustrates the export supply of radiata pine logs during the period studied. Here, too, the area in particular age classes was appropriate for estimating future exports. The function was not pertinent to performance-grade logs during the data period, however, because the low prices of radiata pine logs relegated them to construction-grade status. Aggressive marketing and increased timber management are expected to broaden the range of uses for plantation timber and increase market acceptance and log prices. We assumed that 10 percent of export logs from Chile will be in performance grades by 1995, with the percentage rising to 12 by 2000.

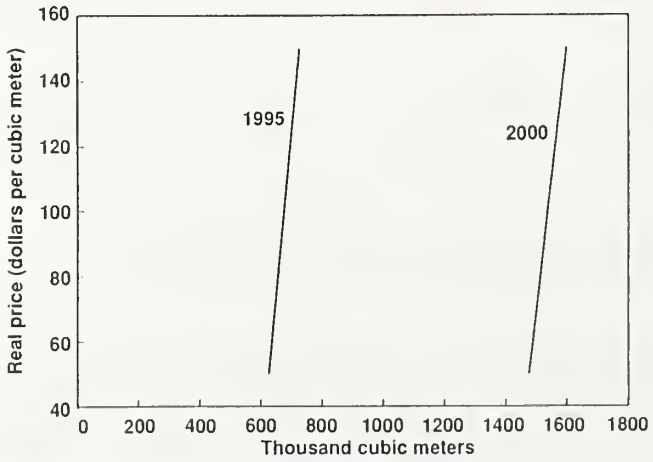

Figure 3—Export supply of midgrade softwood logs from Chile. None of the supply is expected to compete in this grade group until 1995.

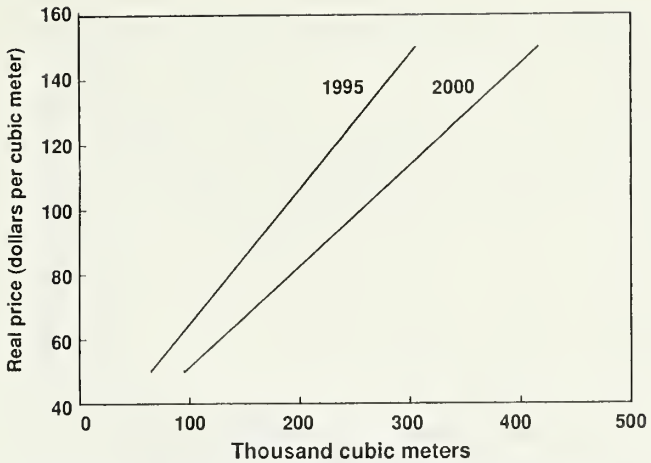

Figure 4—Export supply of midgrade softwood logs from New Zealand. Volumes in this grade group are projected to be insignificant until 1995.

New Zealand

Supply estimates for New Zealand are shown in figure 4. Longer rotation ages associated with intensive management are reflected in the equation. Radiata pine exports from New Zealand are expected to remain in the construction-grade value zone for the near term, with 15 percent achieving performance-grade values by 1995 and another 5 percent by 2000.

Although helping to explain export behavior in past years, a variable for an area reaching age 40 has only limited usefulness in estimating the future. Many fast-growing conifer stands in New Zealand are expected to be harvested at earlier ages. The 40-year phenomenon reflects an age bulge in the forest inventory. Recent privatization of Federal forestry has removed direct involvement of the Government in wood products export policy. Thus the supply projection is largely subjective, as is the performance-log component of the exports mix.

Canada

Longstanding Provincial and Federal policies have generally constrained export log volumes to those deemed, via a permit process, surplus to domestic needs or economically unviable in the domestic market. The recent economic recession was especially intense along the west coast of British Columbia, historically the source of most of Canada's export logs. The economic difficulty led to permission for substantial exports under implementation rules that allow preharvest assignments and several-year periods for consummating the permitted shipments. Log exports have become a substantial part of the B.C. forest economy, with increases in 1986 and 1987 to about one-third of U.S. softwood roundwood exports.

Over the 1963-87 period, when offshore log demand was especially strong, the year-to-year export volume from Canada was influenced more by demand factors than by supply elements, a circumstance also characteristic of Alaska, the lower 48 States, and indeed all Pacific Rim supply regions.

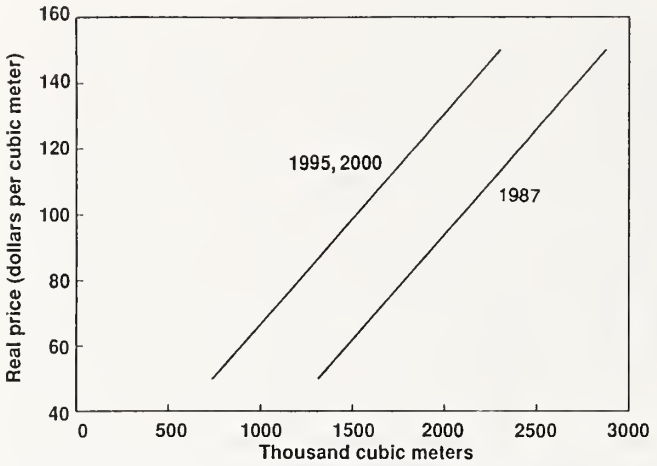

Figure 5—Export supply of midgrade softwood logs from Canada to offshore countries. At 1987 prices, future volumes are assumed to stabilize at three-fourths of the 1987 level.

Log prices for apparently identical grades have long been lower in the export trade from Canada than in the U.S. export market, even after accounting for species. The congenital difference was accounted for in the development of supply projections in Canada. A constructed supply function drew on a stochastic estimate of price elasticity, adjusted over time to conform to the premises that export volume-supply function will stabilize at about three-fourths of its 1987 level, in response to policy, and performance grades will account for 65 percent of the volume in 1995 and 50 percent in 2000. Figure 5 displays Canadian supply retrenchment in performance-grade logs.

The Soviet Union

Despite the great physical abundance of timber in the Soviet Far East, economic scarcity prevails. Much of the timber is low in size, quality, volume per hectare, and accessibility. The boreal forests are in an environment that is one of the coldest on earth. Harvests, processing, and transport to Pacific Ocean ports nevertheless have increased for a decade, helped by a new 2,000-mile east-west railroad through the heart of the eastern timber region in the U.S.S.R. There is little question that forests of eastern Siberia and the Far East are being scouted for removal of the more valuable species and developed for higher concentrations of better quality larch.

Between 1985 and 1986, Soviet log exports to China increased by about 300 million board feet; this was accompanied by an increase of over 150 million board feet to Japan. Although there was an offsetting reduction in exports to Japan of about 180 million board feet in 1987, the swift response to Chinese demand indicates a new flexibility and substantial expansion in Soviet timbering.

Export sales to China, which are about 30 percent of Soviet Pacific Rim exports, typically involve barter for goods and service to escape direct price denomination. Sales to Japan involve long-term contracts to deliver stated volumes, 1-year arrangements, and joint development agreements; the interaction between price and quantity is muted if not absent. Because of the nature of the sales, Soviet log supply was characterized in this study as price-inelastic. The vertical supply curves of figure 6 demonstrate the effects of the inelasticity assumption.

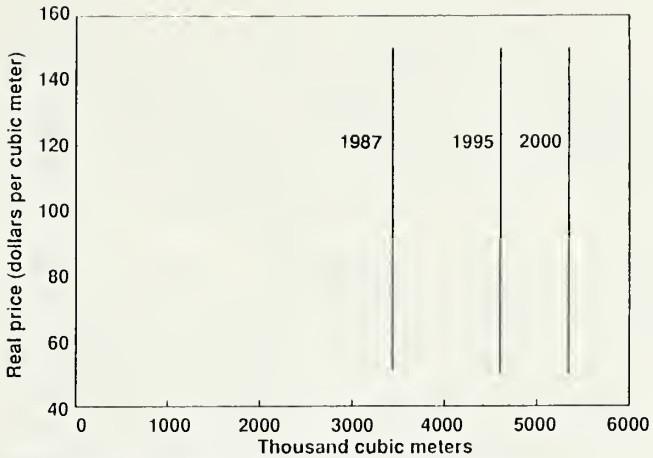

Figure 6—Export supply of midgrade softwood logs from the U.S.S.R. to Pacific Rim countries. Shipments are projected to increase at 3 percent per year.

Of the volume exported, performance grades included three-fourths of the white fir (*Abies* spp.) and spruce (*Picea* spp.) going to Japan and half of the volume going to China. We used a supply increase of 3 percent per year in the study.

China

Market involvement in the Pacific Northwest by China has shown their purchases to be price-sensitive. Chinese aggregate spending on imports of all kinds, including wood products, has been closely related to available foreign exchange and to national income, factors closely related in China's case. We used a hyperbolic demand function (fig. 7) with price in the denominator and total value of conifer log imports in the numerator. Performance grades accounted for 68 percent of the conifer log imports. An equation relating log spending to national income drives the numerator. National income is projected to increase, in real terms, 5 percent per year on average. Political and institutional factors are expected to bear on the growth rate, which is modest relative to earlier Chinese experience and to developing countries in general.

Japan

Japanese wood products markets and preferences are well understood in Alaska after three decades of commercial association in wood products. Alaska's role has been preeminent in supplying select grades of cants and lumber to Japan. Japan accounts for about 70 percent of performance-grade logs imported by Pacific Rim nations. Of all Japanese log imports, performance grades account for 90 percent of those from the United States, 85 percent of imports from Canada, and 75 percent of Soviet species (other than larch) sent to Japan. Small amounts of radiata pine from New Zealand and Chile are expected to enter this grade range in Japanese markets during the 1990s.

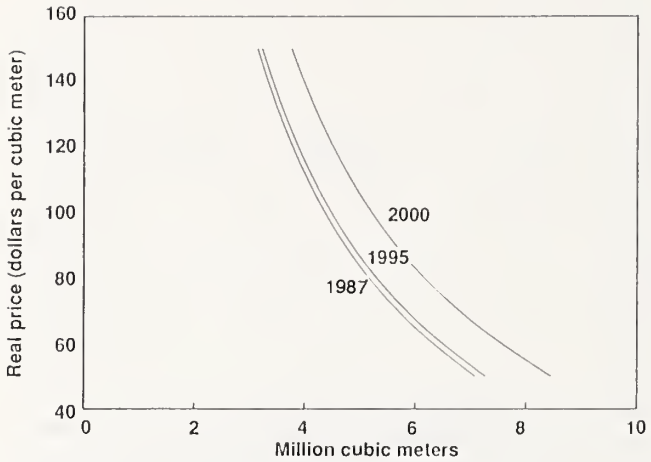

Figure 7—Import demand by China for midgrade softwood logs. A fall in the value of China's currency in the mid-1980's accounts for the modest demand increase between 1987 and 1995.

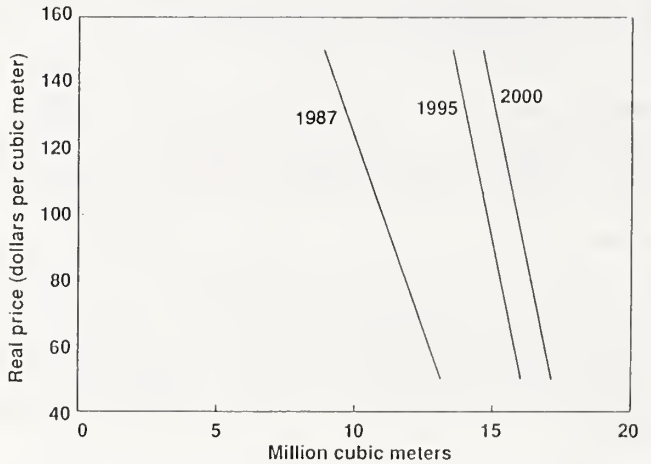

Figure 8—Import demand by Japan for midgrade softwood logs. The rising value of the yen accounts for part of the considerable 1987-95 increase.

Figure 8 shows Japan's performance-grade log demand. It is estimated from projections of commercial and residential wood-based construction. Although housing starts are often used to portray and extrapolate Japanese wood products demand, starts have substantially underpredicted Japanese log and sawn-wood imports. Residential projections were founded on work by Ueda and Darr (1980). Wood-based floor area was 72,500 square meters (m^2) in 1985, of which the residential component was about 60,000 m^2. The residential area was assumed constant through the rest of the 20th century, with a decline in the number of units offset by prosperity-induced increases in floor area per residence. It was assumed that nonresidential area will track gross domestic product (GDP) at 4 percent per year to 1990 and at 5 percent thereafter.

Demand projections for Japan must recognize the 25 million acres of softwood plantations there. The product of post-World War II forest renewal, these large areas have already reached ages for planned harvests. Intermediate thinnings and other treatments have been prevented, however, by high labor costs; the national prosperity has preempted expectations of an abundant, low-cost, rural workforce. Thus, in the 1990's, it is expected that Japanese plantation timber will emerge significantly in the construction grades but not in the performance strata.

Republic of Korea

A longtime importer of roundwood from North America, Korea has secured a large market segment by emphasizing construction-grade logs. Initial interest by Korea in substituting softwoods for the hardwoods formerly available for plywood production has not generated significant change in their softwood import strategy. Instead, various hardwoods, from North America and elsewhere, are apparently meeting the need. In any case, we assumed that Korea will remain an important customer for construction-grade material, but that imports of performance grades will not be significant during the 1990's.

Taiwan

Although heavily populated, Taiwan's rugged topography has supported hardwood and softwood forests that have not loomed large in the Pacific Rim context but have supplied all the softwood consumption needs of Taiwan. Softwood harvests have declined steadily since 1970, however, as the timber resource has been reduced.

Taiwan, like Korea and Japan, has experimented with softwoods in plywood production, a softwood use discouraged by other available hardwoods and by substantial increases in hardwood plywood production in Indonesia. We think, though, that Taiwan will become an importer of softwoods for general construction and some residential use as domestic softwood resources diminish. We assume that Taiwan's imports will be in the performance grades.

Because data on the import market do not exist, a function for net ("excess") demand was developed by subtracting a domestic-supply function from one for demand, the latter involving GDP and a price coefficient drawn from a hardwood-demand function. Of hardwoods consumed currently, 16 percent go for construction and 27 percent for core stock; both are uses in which softwood input is feasible. Economic growth was forecast at 8 percent per year through 1990 and 5 percent thereafter. Figure 9 shows the resulting estimates of future construction-grade imports.

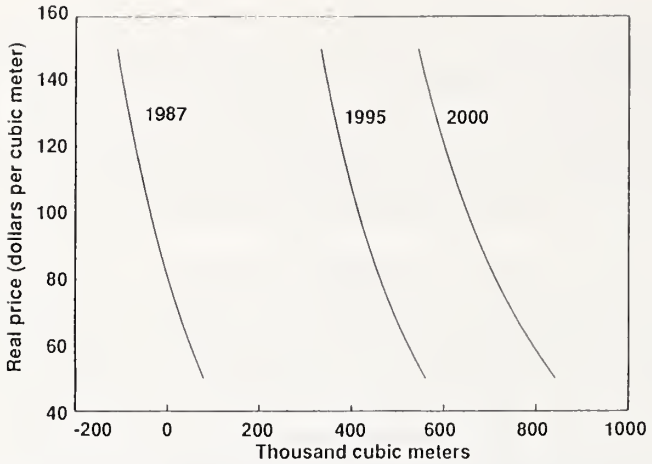

Figure 9—Import demand by Taiwan for midgrade softwood logs. The volume scale is 1/1000th of that for other demand countries.

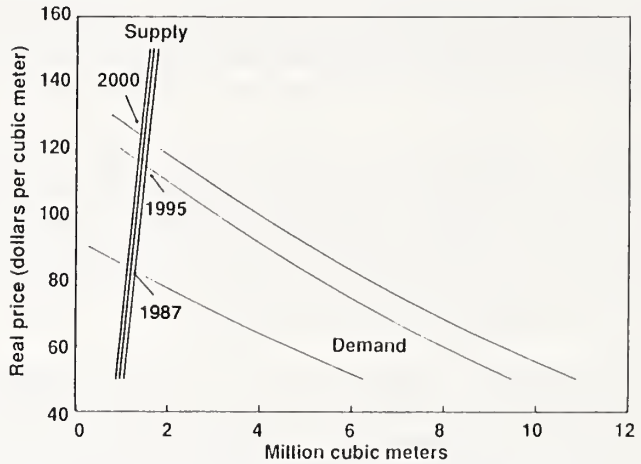

Figure 10—Dockside supply in Alaska and demand for export midgrade softwood logs. Supply is from figure 1; demand is total Pacific Rim demand for such logs, less supply from regions other than Alaska. The supply-demand intersection for each year indicates the price and volume for that year.

Results

Figure 10 shows the supply curve for Alaska and Pacific Rim demand for performance-grade logs for the 1987 reference year, 1995, and 2000. The supply-demand intersections show that prices are expected to rise, in real terms, about 3 percent per year, on average, through the rest of the 20th century if recent exchange rates and moderate economic growth in Pacific Rim countries remain stable.

Effects of supply shifts in Alaska on prices and shipments can be judged from figure 10. The large scale of Pacific Rim log-trade activity relative to that of Alaska is responsible for the flat (highly elastic) demand curves. The curve for net Pacific Rim demand crosses the aggregate demand curve in 1995 at about $35 per cubic meter (about $160 per MBF) above the 1987 intersection. The increase is about 45 percent, an average gain of 3.7 percent per year over the 8-year interval. Between 1995 and 2000, the increase is $9 per cubic meter (about $40 per MBF), a 5-year rise of 8 percent or 1.5 percent per year.

In Alaska (and the lower 48 States), supply functions shift left, but higher prices are projected to induce increased exports in this grade category. Specific increases for Alaska are 70 million board feet (26 percent) by 1995 followed by a 30-million-board-foot decline in 1995-2000.

Because both export volumes and prices are expected to increase in Alaska, income from offshore log sales should rise markedly. At-the-dock total values of the performance-grade trade are expected to increase 80 percent between 1987 and 2000, or about $75 million in constant dollars.

In figure 11, total Pacific Rim supply is plotted with total demand to produce the same equilibrium prices as shown in figure 10. Prices in the large Pacific market for midrange logs are insensitive to Alaska supplies and can be expected to remain insensitive. Aggregate demand for such logs had a 1987 elasticity of 0.46; as seen from Alaska, however, offshore demand had an elasticity of 9.1.

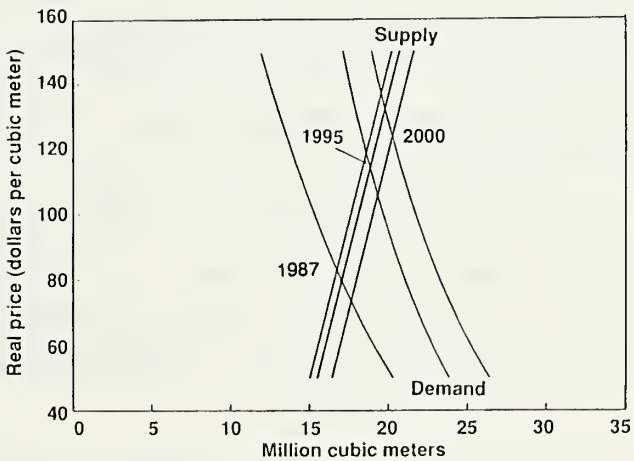

Figure 11—Aggregate Pacific Rim supply and demand for softwood midgrade logs. The supply-demand intersection for each year indicates the price and volume for that year. Supply includes all exporting regions including Alaska; demand includes all importing areas. Prices correspond to dockside in North America.

The annual volume of performance-grade logs traded across the Pacific is projected to grow less rapidly in percentage terms, as indicated in figure 11. The 16.7 million cubic meters moved in 1987 (about 3.7 billion board feet) will, according to the projections, grow to 18 million cubic meters (about 4.0 billion board feet) by 1995 and 20.4 million cubic meters (about 4.5 billion board feet) by 2000. This is a 1.0-percent annual growth rate to 1995 and 2.5 percent per year thereafter.

These are significant gains for midgrade-log trade in the Pacific region, albeit modest for Alaska. The 22-percent increase in performance-grade movements, coupled with the 30-percent increase for structural-grade logs projected in the earlier report (Flora and Vlosky 1986), suggest steady gains in timbering, port activity, and transport business.

As seen in the above figures, the greatest absolute volume growth is expected to occur in Japan's imports, with an increase of 3 million cubic meters, or about 700 million board feet, by 2000. The greatest supply gain will come from Chile in the 1995-2000 period; this reflects both increased log exports overall and a shift upward in their perceived value as well as their physical quality. Shipments from Canada are projected to decline.

These projections are intended to indicate trends of a decade and longer. Not included are intermediate cyclic fluctuations. The reference year, 1987, was selected partly because it was at neither the bottom nor the top of an economic cycle. The 1987-88 upswing in wood products markets has already involved price increases approaching those projected here for the entire 15-year period to 2000. We expect that periodic market reversals will erase the increases and that the overall trend will prevail. Users of the analysis should assume, with business cycles increasing in duration and magnitude since the early 1970's, that price and shipment trends of the magnitude indicated by the analysis may well be obscured by fluctuating economic conditions in the Pacific basin.

The outlook for performance-grade logs is, in any case, more favorable than for construction grades (Flora and Vlosky 1986). Future prices for low-end logs were estimated to increase about 1 percent per year into the early 1990's but become flat through 2000. This trend was not considered promising for residual stands of small timber in Alaska. The grade-related trend differential can reasonably be generalized. Upper grades of roundwood (and presumably cants) can be expected to not only maintain their value difference but also expand it.

The steepness (low elasticity) of the aggregate supply and demand curves of figure 11 indicates that any error in gauging the underlying forces driving the export trade has a greater percentage effect on prices than on volumes. Too, economic, social, or political circumstances that shift demand or supply will apparently affect prices more visibly than volumes. The user must be conscious of the background assumptions involved in the study as well as the likelihood that market cycles will shift the supply and, particularly, demand curves about.

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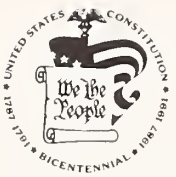

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